CLAIMS:

We claim:

1. A variable reluctance motor comprising:

a stator;

at least one drive coil to generate an electromagnetic field in response to an input current;

an armature movable relative to the stator along a predetermined path of travel in response to generation of the electromagnetic field; and

at least one magnetic member to generate a biasing force, wherein the at least one magnetic member is provided to cause the biasing force to act on the armature in a substantially balanced manner.

2. The motor of Claim 1 wherein the at least one magnetic member is a permanent magnet member.

3. The motor of Claim 1 wherein the at least one magnetic member is an electromagnetic member.

4. The motor of Claim 1 wherein an output force generated by the motor is substantially linearly related to the input current.

5. The motor of Claim 1 further comprising:

a back iron that defines a path of travel for the electromagnetic field that is substantially magnetically conductive.

6. The motor of Claim 1 wherein the armature is linearly movable relative to the stator.

7. The motor of Claim 1 wherein the armature is rotationally movable relative to the stator.

8. The motor of Claim 1 wherein the biasing force acting on the armature is greater than a force induced on the armature by the electromagnetic field generated by the drive coil.

9. The motor of Claim 1 wherein the at least one magnetic member is located substantially outside of a path traveled by the electromagnetic field induced by the at least one drive coil.

10. The motor of Claim 1 comprising:

a first and second drive coil electrically connected to generate the electromagnetic field in response to the input current.

11. The motor of Claim 1 wherein in response to an input current in a first direction the electromagnetic field generated by the at least one drive coil increases a first portion of the biasing force and decreases a second portion of the biasing force to move the armature in a first direction and in response to an input current in a second direction the electromagnetic field generated by the at least one drive coil increases the second portion of the biasing force and decreases the first portion of the biasing force to move the armature in a second direction.

12. The motor of Claim 11 wherein the input current is an alternating current.

13. An implantable hearing aid transducer comprising:

a transducer body;

an actuator movable relative to the transducer body to stimulate an auditory component when the actuator is interfaced with the auditory component;

a driver comprising a variable reluctance motor to move the actuator in response to an input current, wherein an output force of the variable reluctance motor is substantially linearly related to the input current.

14. The transducer of Claim 13 wherein the variable reluctance motor comprises:

a stator;

at least one drive coil to generate an electromagnetic field in response to an input current;

an armature movable relative to the stator in response to generation of the electromagnetic field; and

at least one magnetic member to generate a biasing force, wherein the at least one magnetic member located relative to the armature to cause the biasing force to act on the armature in a substantially balanced manner.

15. The transducer of Claim 14 comprising:

a biocompatible enclosure, enclosing the variable reluctance motor.

16. The transducer of Claim 15 wherein the biocompatible enclosure comprises:

a first biocompatible enclosure enclosing the armature and a second biocompatible enclosure enclosing the stator.

17. The transducer of Claim 14 comprising:

at least one member to laterally support the armature relative to the stator and permit axial movement of the armature relative to the stator.

18. The transducer of Claim 14 wherein the actuator is selectively interconnectable to the armature along a continuum of position.

19. The transducer of Claim 14 wherein the at least one magnetic member is a permanent magnet member.

20. The transducer of Claim 14 wherein the at least one magnetic member is an electromagnetic member.

21. The transducer of Claim 14 wherein the biasing force on the armature is greater than a force induced on the armature by the electromagnetic field generated by the drive coil.

22. The transducer of Claim 14 wherein the at least one magnetic member is located substantially outside of a path traveled by the electromagnetic field induced by the at least one drive coil.

23. The transducer of Claim 14 comprising:

a first and second drive coil electrically connected to generate the electromagnetic field in response to the input current.

24. The transducer of Claim 14 wherein in response to an input current in a first direction the electromagnetic field generated by the at least one drive coil increases a first portion of the biasing force and decreases a second portion of the biasing force to move the armature in a first direction and in response to an input current in a second direction the electromagnetic field generated by the at least one drive coil increases the second portion of the biasing force and decreases the first portion of the biasing force to move the armature in a second direction.

25. The transducer of Claim 24 wherein the input current is an alternating current.

26 A method of operating an electric motor, the method comprising:

generating an electromagnetic field in a stator portion of the motor in response to the input current;

moving an armature portion of the motor relative to the stator portion in response to the generated electromagnetic field, wherein a reluctance of the motor varies during the moving step as a function of the armature position relative to the stator portion;

producing a force that is substantially linearly related to the input current.

27 The method of Claim 26 the method comprising:

inducing a biasing force on the armature portion of the motor at least while the input current is provided.

28. The method of Claim 27 wherein the inducing step comprises:

inducing a substantially balanced magnetic force acting on the armature of the motor.

29. The method of Claim 28 wherein the moving step comprises:

providing an input current in a first direction to generate the electromagnetic field in the first direction;

increasing a first portion of the biasing force with the electromagnetic field generated in the first direction;

decreasing a second portion of the biasing force with the electromagnetic field generated in the first direction to move the armature in the first direction;

providing the input current in a second direction to generate the electromagnetic field in the second direction;

increasing the second portion of the biasing force with the electromagnetic field generated in the second direction; and

decreasing the first portion of the biasing force with the electromagnetic field generated in the second direction to move the armature in the second direction.